Combined use of time and frequency domain variables in signal-averaged ECG as a predictor of inducible sustained monomorphic ventricular tachycardia in myocardial infarction.

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BACKGROUND. Time and frequency domain analyses of signal-averaged ECG (SAECG) have several individual limitations, and the results of the two methods sometimes vary considerably. The purpose of this study was to determine whether the combined use of time and frequency domain variables facilitates identification of patients who will have ventricular tachycardia (VT) induced during programmed ventricular stimulation (PVS). METHODS AND RESULTS. Nine myocardial infarction (MI) patients with clinically documented sustained monomorphic VT (SMVT), 40 MI patients without clinical VT, and 30 normal healthy control subjects were evaluated. PVS using three extrastimuli and SAECG recording were performed in the MI patients on day 36 +/- 4 after infarction. Of 40 MI patients, SMVT was inducible in 14, sustained polymorphic VT in three, nonsustained monomorphic VT in three, nonsustained polymorphic VT in two, and no inducible arrhythmia was obtained in 18. There were significant differences between MI patients with inducible SMVT and without inducible SMVT in the following SAECG variables: filtered QRS durations (high-pass filter setting, 25, 40, and 80 Hz); low-amplitude signal durations (LAS) under 10, 20, 30, and 40 microV (high-pass filter setting, 40 and 80 Hz); root-mean-square voltages (RMS) of the terminal 20, 30, 40, 50, and 60 msec (high-pass filter setting, 40 and 80 Hz); area ratio (area 20-50 Hz/area 0-20 Hz x 10(5)) of a 120-msec sampling interval starting 20 msec before QRS offset; factor of normality on lead X; and minimum value of the variables on lead X, Y, or Z. Stepwise logistic regression analysis selected only LAS under 30 microV (high-pass filter setting, 80 Hz) and area ratio as independent predictors of inducible SMVT. With these two variables, the predicted probability of inducible SMVT [p(VT)] was expressed as p(VT) = 1/[1+exp (6.2-0.11 LAS-0.01 area ratio)]. This function had 93% sensitivity, 81% specificity, 72% positive predictive value, 95% negative predictive value, and 85% predictive accuracy with greater than or equal to 0.3 as the criterion of a positive test. CONCLUSIONS. The combined use of time and frequency domain analysis of SAECG can enhance the accuracy of this technique as a screening test for results of PVS in MI patients without clinical VT.

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